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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/814,682

03/31/2004

Wen Lin

LIN 13-38

8308

47396

7590

10/14/2005

HITT GAINES, PC
AGERE SYSTEMS INC.
PO BOX 832570
RICHARDSON, TX 75083

EXAMINER

MALDONADO, JULIO J

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 10/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/814,682

Applicant(s)

LIN ET AL.

Examiner

Julio J. Maldonado

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 August 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 21-27 and 37-40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 21-27 and 37-40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

1. The rejection as set forth in Office Action mailed in 04/20/2005 is withdrawn in view of the omission of claim 40 in the rejection.
2. Claims 21-27 and 37-40 are pending in the Application.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 21-27 and 37-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bevk et al. (U.S. 5,500,391).

In reference to claims 21-23, 37, 38 and 40, Bevk et al. (Figs.2 and 6) teach a MOS device including a co-doped germanium buried layer (34) located over a doped substrate (10); a doped epitaxial layer (30) located over the co-doped germanium buried layer (34); and transistors located over the doped epitaxial layer (30), wherein said dopant is boron and wherein said germanium layer (34) is used to control the diffusion of said dopant (column 1, line 53 – column 4, line 30).

Bevk et al. fail to expressly teach wherein said MOS device further includes interconnects located within interlevel dielectric layers located over the transistors, which connect the transistors to form an operational integrated circuit and additional active and passive devices. However, it is well-known in the art directed to MOS devices that these devices further include interconnects and other active and passive

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devices located within interlevel dielectric layers located over the transistors, which connect the transistors to form an operational integrated circuit as evidenced, for example, by Schwabe to U.S. 4,462,149 (column 2, line 62 – column 3, line 16), Murakami to U.S. 4,819,043 (Fig.3M, column 4, lines 26 – 47) and Liu to U.S. 5,476,903 (Fig.8, column 6, lines 9 – 30). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made that to enable the MOS device as disclosed by Bevk et al. to further include interconnects located within interlevel dielectric layers located over the MOS devices of Bevk et al. to arrive at the claimed invention.

In reference to claims 24 and 25, Bevk et al. substantially teach all aspects of the invention but fail to disclose wherein a dopant concentration of the co-doped germanium buried layer ranges from about 1×10^{15} atoms/cm³ to about 1×10^{20} atoms/cm³, a dopant concentration of the doped substrate ranges from about 1×10^{14} atoms/cm³ to about 1×10^{15} atoms/cm³, and a dopant concentration of the doped epitaxial layer ranges from about 1×10^{14} atoms/cm³ to about 1×10^{15} atoms/cm³. However, the selection of the selected dope ranges is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species to obtain a desired dopant concentration on the substrate, germanium layer and the epitaxial layer. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the above-mentioned dopant concentration to arrive at the claimed invention.

In reference to claims 26 and 27, Bevk et al. substantially teach all aspects of the invention but fail to disclose wherein the co-doped germanium buried layer has a thickness ranging from about 1 μm to about 10 μm , and wherein the doped substrate, co-doped germanium buried layer, and the doped epitaxial layer collectively have a thickness ranging from about 2 μm to about 20 μm . Notwithstanding, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose these particular dimensions because applicant has not disclosed that the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

Response to Arguments

5. Applicant's arguments filed 08/01/2005 have been fully considered but they are not persuasive.

Applicants argue, "in Bevk, a process for making a MOS device is described that includes a structure with a boron-doped, epitaxial silicon layer 32 enclosed between

upper and germanium-rich, epitaxial boundary layers 34. Each of the boundary layers will typically consist of at least two, but fewer than six, monolayers of substantially pure germanium. (Col. 3, lines 21-26). Bevk...describes a pure and not a co-doped germanium buried layers...”.

In response to this argument, the term “substantially pure” encompass a level of impurity. Furthermore, according to Fig.6, there is a concentration of boron atoms that goes from layer (110), down to the substrate (10). Therefore, there are impurities in the germanium layer.

Conclusion

6. Applicants are encouraged, where appropriate, to check Patent Application Information Retrieval (PAIR) (<http://portal.uspto.gov/external/portal/pair>) which provides applicants direct secure access to their own patent application status information, as well as to general patent information publicly available.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Julio J. Maldonado whose telephone number is (571) 272-1864. The examiner can normally be reached on Monday through Friday.

8. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith, can be reached on (571) 272-1907. The fax number for this group is 571-273-8300. Updates can be found at <http://www.uspto.gov/web/info/2800.htm>.


Julio J. Maldonado
Patent Examiner

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Julio J. Maldonado
September 29, 2005


George Fourson
Primary Examiner